

From: Eve Clute
To: Nancy Rumrill/R9/USEPA/US|||EPA
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Subject: REQUEST for PUBLIC HEARING ON LAHAINA WASTEWATER
INJECTION WELL PERMIT.

Nancy Rumrill

REQUEST for PUBLIC HEARING ON LAHAINA WASTEWATER INJECTION
WELL PERMIT.

I request a public hearing public hearing, by EPA on the permit for the Lahaina
Wastewater Injection well.

In my November 2008 testimony, I supported reuse of R-1 treated waste water effluent on brush fires, resort landscaping irrigation and fallow sugar cane fields. After learning more about antibiotic resistant genes [ARG's], I suggest that UV radiation is insufficient to protect the public health from the potential event of necrotizing fasciitis [flesh-eating bacteria.] Insufficiently treated wastewater brought into the public swimming, snorkling, and diving areas via injection wells or through use on land via irrigation can result in illness from diarrhea to serious staph infections to necrotizing fasciitis. Hawaii has had cases of necrotizing fasciitis, 6 resulting in death and the others resulting in amputation.

Information from a study by First, et.al. encysted microbes live inside other microbes in the sewage, treatment never reaches them since they are shielded from UV by being inside.

The U.S. EPA is not involved formerly in recycled water, that is left to the states. EPA does however have control over sewer plants and their effluent. The issue of released antibiotic resistance and antibiotic resistant pathogens is a well known result of current sewer plant operations.

Once ingested, the genetic material may be transferred to normal flora, and subsequently to pathogenic bacteria found in humans or animals, making later treatment with particular antibiotics ineffective. Also one must consider transfer of genetic information from these organisms to more robust organisms as highlighted by Sjolund et al. (2005) indicated that resistance in the normal flora, which may last up to four-years, might contribute to increased resistance in higher-grade pathogens through interspecies transfer. The four year limit is an artifact of their study which lasted only four years.

Sjolund et al go on to note that since populations of the normal biota are large, this affords the chance for multiple and different resistant variants to develop. This thus enhances the risk for spread to populations of pathogens. Furthermore, there is crossed resistance. For example, vancomycin resistance may be maintained by using macrolides.

It is important to reflect on just how rapidly antibiotic resistance can develop. It only takes one resistant pathogen to create millions in 24 hours.

In one study, methacillin resistant *Staphylococcus aureus* had developed in 7 days within patients that had no history of harboring this pathogen. Schentag, et al. (2003), followed surgical patients with the subsequent results. Pre-op nasal cultures found *Staphylococcus aureus* 100% antibiotic susceptible. Pre-op prophylactic antibiotics were administered. Following surgery, cephalosporin was administered. Ninety percent of the patients went home at post-op day 2 without infectious complications. Nasal bacteria counts on these patients had dropped from 10⁵th to 10³rd, but were now a mix of sensitive, borderline, and resistant *Staphylococcus* sp. By comparison, prior to surgery, all of the patients' *Staphylococcus* samples had been susceptible to antibiotics. For the patients remaining in the hospital and who were switched on post-op day 5 to a second generation cephalosporin (ceftazidime), showed bacterial counts up 1000-fold when assayed on post-op day 7 and most of these were methicillin resistant *Staphylococcus aureus* (MRSA). These patients were switched to a 2-week course of vancomycin. Cultures from those remaining in the hospital on day 21, revealed vancomycin resistant enterococcus (VRE) and candida. Vancomycin resistant enterococci infections can produce mortality rates of between 42 and 81%.

Reclaimed wastewater needs to meet and exceed current R-1 standards to prevent superbugs like MRSA, pharmaceuticals (expired Rx drugs flushed down the toilet) and antibiotic resistant genes (ARGs) that remain intact and become part of the effluent. When R-1 effluent is reused or injected into the environment, it can compromise the health of the public. (Kinney, 2006; Kummerer, 2004; Marcinek, 1998; Nakamura, 1990; Pruden, 2006; Ribeiro-Dias, 1983; Rooklidge, 2004.)

This then brings into question the current paradigm on infection and its dose response to a certain load of a particular pathogen, i.e., ID and LD 50s. Lateral transfer of mobile genetic elements conferring resistance is not considered in this old paradigm. With the prodigious capacity for the gut bacteria to multiply, once the lateral transfer has taken place, very small original numbers---well below the old paradigms can be multiplied into impressive numbers. Since viruses and phages are also involved, their capacity to multiply, which dwarfs that of bacteria, must also be included. Thus there is a need for a new paradigm; unfortunately, the regulatory community seems not to recognize this. When one considers the multiplication within sewer plants and also within their byproducts, disbursement into the environment, the transfer to background organisms, hence to man and his animals, then the remultiplication within commensals, the emerging picture is worrisome.

For example, Methicillin-resistant *Staphylococcus aureus*, commonly known as MRSA, is a drug-resistant strain of bacteria currently on the rise in hospitals and communities.

MRSA typically infects wounds or surgical incisions, but where most staph infections could be treated with methicillin, penicillin or other drugs, MRSA fails to respond. In addition, SARS, Ebola virus, and other similar infectious pathogens are superbugs that have received media attention for their resistance to antibiotics and other drugs.

In California, at Montecito San's outfall where trackers were released at the outfall and then from the open ocean at 1000 and 2000 plus feet. Thus there are 3 sets of trackers, the closest to shore is the actual outfall. These are followed in real time via GIS to show where the effluent is likely to move. The outer two sets merely show the overall current movement. The effluent comes right back to shore where people walk barefoot and wade in the the near shore waters.

One example is the twelve month study of the City of Santa Barbara's El Estero sewer plant (2008), which operates at R-1 standard. The report demonstrated that the wastewater contains pathogens of multi-antibiotic resistant bacteria and the standards used to indicate bacteria did not adequately measure these pathogens.

I would like to make of a more fully developed presentation before the EPA at a public hearing.

Sincerely,

Eve Clute

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